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ABSTRACT

Recent concern with the ecological context of childrearing has sparked research interest in the effects of children's environment on their behavior. This study describes toy availability and use in naturally occurring childrearing environments, and then examines relationships between these aspects of the environment and peer interaction. It was hypothesized that children who have greater access to large play equipment would have more frequent advanced peer interaction. Toddlers (N=40) were observed in daycare centers, and socially directed behaviors between toddlers and peers were time-sampled. Results indicate that high level interactive play is maintained by an inanimate environment which organizes space so that toddlers can focus on each other and respond to each other's actions on the physical environment without physically intruding. It is impled that peer interaction among toddlers appears to be context-specific, and that the inanimate environment also has to be defined in terms of spatial arrangements in which children may interact. (KA)

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PEER PLAY AND THE EFFECT OF THE INANIMATE ENVIRONMENT

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Recent concern with the ecological context of child-rearing has sparked research interest in the effects of children's environments on their behavior. For a review of this literature, see Gump (1975). Parallel theoretical and empirical examinations have focused on the relationship between the development of infant peer interaction and objects. Mueller and his colleagues have argued that an infant's attention is directed to a peer via his/her interest in the other's action on an object (Mueller and Lucas, 1975; Mueller and DeStefano, 1973). However, laboratory investigations have found that peer interaction becomes more frequent when toys are removed from the room or when only large play equipment is present (Eckerman, 1977; DeStefano and Mueller, 1976). So the question remains: what role do objects play in influencing peer behavior? In the study reported in this paper we describe toy availability and use in naturally occuring childrearing environments and then examine relationships between these aspects of the environment and peer interaction. We expected that the children who had greater access to large play equipment would have more frequent advanced peer interaction. Large objects permit simultaneous use by two children without the imposition of having to take turns or to share (DeStefano and Mueller, 1976); their size and shape facilitate focusing on a peer without physical intrusion (for example, peeking at each other through the bars of a climbing structure or each child taking a seat in the rocking boat).

As part of a larger investigation of infant daycare, we observed 40 nineteen-month-old toddlers, 20 in family daycare homes and 20 in daycare centers. The family and center groups were equivalent in age, sex, parental education and occupation, family composition, ethnic and racial background, and length of time in daycare.

Socially directed behaviors between toddlers and their peers were time-sampled in the daycare setting for two hours per child. This procedure yielded a total of 240 15-second units. Level of peer play was coded in each time-sampling unit where the toddler engaged in activity with another. The levels of peer play were parallel plus mutual regard, parallel plus social interaction, reciprocal plus mutual regard and reciprocal plus social interaction. The type of object used in play and the number of portable and nonportable objects available to the toddler were recorded. Interobserver reliability for the codes reported in this paper ranged from .87 to 1.0, with a median of .98.

Results

Table 1 presents differences in availability of objects in the two daycare settings. The toddlers in family daycare had more portable toys available per child than the toddlers in daycare centers. This implies that the toddlers in daycare centers had to do more sharing of small portable

toys.

Toddlers in daycare centers had more nonportable objects available for use in their play. Nonportable was defined as too big for a toddler to carry and big enough to hold two toddlers at once (e.g., a slide or platforms). The score for number of nonportable objects was obtained by adding the number of nonportable play equipment to the number of nonportable household items used in the course of play. The toddlers in daycare centers had more nonportable play equipment than family daycare toddlers.

Based on observations of home-based toddlers, we had expected that toddlers in family daycare would make use of more nonportable household items as play objects. This was not found; there was no difference between the settings in numbers of nonportable household items used for play. Instead it was our impression that the toddlers in family daycare used the paths created by the spacial arrangement of the house; these paths included hallways, the circle at the entrances of three adjoining rooms, and the steps between rooms in a split-level house.

Table 2 presents frequencies of interactive play in the two daycare settings. The level of interactive play was scored for each time-sampling unit in which two children engaged in the same or similar activity.

The four levels of interactive peer play represent a developmental sequence from mutual awareness, through con-

tingent interaction, to reciprocal and complimentary interaction. In level 1 play, parallel with mutual regard, the toddlers are in proximity, engaged in the same or similar activity and in eye contact. For example, two toddlers might be fingerpainting with eye contact. If one toddler made a codeable socially directed behavior (i.e., smiled, vocalized, offered an object, took an object, or aggressed to the other) and the recipient of this social behavior only looked, this interaction would still be coded as a level 1. In order to be coded as level 2, parallel plus social interaction, both toddlers had to direct a codeable social behavior to the other. For example, if toddler A pointed to her picture, looked at the other and said 'da' and toddler B smiled and laughed, this fingerpainting interaction would be scored as level 2.

Levels 3 and 4 involve reciprocal and complementary interactions. They often have a game-like quality (e.g., chase, or hide-and-peek). Sometimes the complementary actions, for example running and chasing, are so absorbing in themselves that there is no other social interaction and this contact is coded as level 3 reciprocal play plus mutual regard. More often the toddlers also engage in contingent socially directed behavior and the interaction is coded as level 4, reciprocal play plus social interaction. Reciprocal interaction often has a spiralling or self-accelerating effect. For example, toddler A rolls a ball to toddler B, toddler B returns it,

toddler A returns the ball. They have mastered the game. This mastery leads to smiles and laughter. This positive affect adds to the excitement and a new game, such as run-chase, begins.

The mean level of interactive peer play was calculated by dividing the sum of the weighted frequencies of play at each level by the total units of interactive play. Contrary to our predictions, interactive play was not more advanced in daycare center toddlers who had more nonportable objects available.

When peer play occured the type of object used, as well as the level of play, was recorded. Four categories of object use were possible: portable objects; nonportable objects; a combination (e.g., rolling a truck down a sliding board); and no object. Frequencies of occurence of these four categories are presented in table 3. Toddlers in daycare centers used nonportable objects in their play more often than toddlers in family daycare.

Table 4 presents relationships between frequencies of use of object and frequencies of levels of interactive peer play. High level interactive play was more frequent when the toddlers were using nonportable objects or no objects. Furthermore, when family daycare toddlers were using small nonportable objects they were more likely to play in a parallel fashion.

To further explicate the relationship between the

use of objects during peer play and interactive peer play, a repeated measures analysis of variance was used to compare the mean level of interactive play in the four object conditions. Table 5 presents the mean level of interactive play in each condition. There were significant differences in each setting (Family $F(3.48) = 2.85$, $p < .05$; Center $F(3.48) = 4.29$, $p < .01$). In family daycare mean level of interactive play was highest when toddlers were not using objects. Level of play in the no object condition was significantly higher than the level of interactive play in the combination of objects condition (lsd $t = 2.88$, $p < .05$). In the daycare centers, mean level of interactive peer play was highest when the toddlers were using nonportable objects. This was significantly higher than when no objects (lsd $t = 2.19$, $p < .01$), or a combination (lsd $t = 3.35$, $p < .01$), was used in interactive play.

Several researchers have suggested that peer-directed positive affect is associated with use of nonportable objects (DeStefano and Mueller, 1976), with peer play and competent use of objects (Rubenstein and Howes, 1977) and marks a friendship between toddlers (Howes and Mueller, in press). The relationship between positive affect, peer play, and object use was investigated in this study by a repeated measures analysis of variance of frequencies of toddler or peer socially-directed smiling plus interactive peer play in the four-object conditions. Table 5 presents the frequencies

of expression of positive affect during play in the different object conditions. There were significant differences by type of object used in daycare centers ($F(3.48) = 7.41$, $p < .01$) but not in family daycare ($F(3.48) = 2.35$, NS). In daycare centers significantly more positive affect was expressed when the toddlers were playing together on nonportable objects than when they were playing together with portable objects (lsd $t = 2.62$, $p < .01$), with no objects (lsd $t = 4.05$, $p < .01$) or with a combination of objects (lsd $t = 4.12$, $p < .01$).

The first contribution of this study to the growing literature on the development of early peer interaction is methodological. The coding scheme for interactive peer play provided a reliable way of quantifying peer play at different levels of complexity while retaining the advantages of on-the-spot recording in the natural environment. At lower levels peer play was characterized as parallel plus mutual awareness, and at higher levels by reciprocal and complimentary actions.

The results of this study suggest an important relationship between the ecology of the inanimate environment and peer interaction. In daycare centers where nonportable play equipment was available, toddlers used this equipment as the context for peer interaction. Moreover, interactive peer play which occured on these nonportable objects was higher level play and more often accompanied by positive affect than interactive peer play with other objects. Family daycare

toddlers who had less access to nonportable play equipment had similar frequencies of high level interactive play and the same mean level of interactive play as the daycare center toddlers. Their highest mean level of interactive play occurred when they were not using any objects. Our impression from the informal notes jotted on the code sheets is that no objects is a misleading way to describe this particular inanimate context. The toddlers appeared to be using the spatial arrangements of the home to structure their play. Hallways, corners, and connecting rooms appear to have facilitated both spacing of toddlers and concurrent access in a similar fashion, as did climbing structures or slides in daycare centers. The circle created by three intersecting rooms provided a path for a run-chase game that was very similar to the path created by, in, out, and around the playhouse.

Two laboratory studies of peer interaction between toddlers found that removing small portable toys or providing only nonportable objects promoted peer socially-directed behaviors (Eckerman & Whatley, 1977; DeSteffano and Mueller, 1976). Our study in two natural settings where toddlers could select the type of object used in peer play found that the level of interaction changed with the type of object used. Use of a small portable toy in peer play was associated with more parallel play accompanied by mutual regard and social interchanges.

In contrast, use of large nonportable objects was associated not only with social interchanges but also with reciprocal and complementary interactions.

This study has two main implications. Peer interaction among toddlers appears to be context-specific. That is, it is strongly influenced by the inanimate context. This implies that early peer interaction is embedded in the ecology of the particular inanimate environment in which it is studied.

Secondly, this study suggests that the inanimate environment has to be defined in terms of not only toys, but also the spatial arrangements in which the children may interact. Despite differences between settings in types of toys, level of toddler play was similar. While small toys may initially aid in establishing peer contacts (Mueller and Lucas, 1975), the role of toys in maintaining interaction between well-acquainted toddlers is somewhat different. High level interactive play is maintained by an inanimate environment which organizes space so that the toddlers can focus on each other and respond to each other's actions on the physical environment without physically intruding. These spacial arrangements are found in large nonportable play equipment in daycare centers and in brief stairs and in curving hallways at home.

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Table 1

Numbers of Available Objects in Two Types of Daycare Setting

Type of Objects Available	Type of Daycare: Family Mean	Family SD	Center Mean	Center SD	t
Portable toys per child	12.9	11.4	2.9	1.2	**
Total nonportable objects	2.8	2.1	9.4	14.6	*
Play equipment	1.1	1.4	8.2	14.7	*
Household objects	1.7	1.8	1.2	1.8	

*p < .05

**p < .01

Table 2

Frequencies of Interactive Peer Play in Two Daycare Settings

	Type of Daycare				
	Family		Center		
	Mean	SD	Mean	SD	t
Interactive Play					
Parallel plus mutual regard	17.5	13.2	15.0	11.1	.40
Parallel plus social interaction	8.4	6.5	7.0	6.3	.73
Reciprocal plus mutual regard	3.7	4.9	5.6	6.2	1.04
Reciprocal plus social interaction	8.7	8.8	10.9	17.2	.51
Mean Level of Interactive Play	3.1	.6	3.1	.8	0

Table 3

Use of Play Objects in Peer Play in Two Types of Daycare Settings

	Type of Daycare				
	Family		Center		
Type of Object	Mean	SD	Mean	SD	t
Portable	31.9	28.3	32.7	32.4	
Nonportable	7.4	8.3	19.7	15.7	**
Combination of portable & nonportable	6.6	11.8	9.3	16.5	
No object	7.9	11.6	4.6	5.7	

**p <.01

Table 4

Relationships Between Use of Objects in Peer Play and Interactive Peer Play

Behavior	Type of Object: Portable[a] (Family Center)		Non-portable[b] (Family Center)		Combination[a] (Family Center)		No Object[b] (Family Center)	
Interactive Play								
Parallel plus mutual regard	.74**	-	-	.38*	-	.71**	-	-
Parallel plus social interaction	.57*	-	.39*	.48**	-	-	-	-
Reciprocal plus mutual regard	-	-	.51**	.63***	-	-	-	-
Reciprocal plus social interaction	-	-	.47*	.66***	-	-	.48*	.50*
Mean Level of Interactive Play	-	-	-	.49**	-	-	.51*	-

[a]Pearson Product Moment Correlations, two tail.

[b]Pearson Product Moment Correlation, one tail.

*p <.05; **p <.01; ***p <.001

Table 5

Mean Level of Interactive Peer Play and Frequency of Expression of Positive Affect Between Peers During Peer Play in Different Object Conditions[a]

Object	Mean Level of Interactive Peer Play		Frequency of Positive Affect Expression	
	Family	Center	Family	Center
Portable	2.78	2.84	3.18	3.71
Nonportable	2.49	3.12	1.84	8.35
Combination	1.78	1.97	.65	1.06
No Object	3.21	2.37	2.88	1.18

[a]N=17, 3 toddlers in each setting had no access to nonportable objects.